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UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

SAN FRANCISCO DIVISION

FRANCE TELECOM S.A., Plaintiff, vs. MARVELL SEMICONDUCTOR, INC., Defendant.	Case Number: CV-12-04967-WHO **DEFENDANT MARVELL SEMICONDUCTOR, INC.'S RESPONSIVE CLAIM CONSTRUCTION BRIEF** Date: Time: Place: Courtroom 2, 17th Floor, San Francisco Courthouse Judge: Hon. William H. Orrick

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"H. Ex. __" refers to an exhibit to the Declaration of Eric Huang submitted herewith.

"Min Ex. __" refers to an exhibit to the Declaration of Paul S. Min submitted herewith..

I. INTRODUCTION

Pursuant to Patent Local Rule ("Pat. L.R.") 4-5 and the Court's schedule (D.I. 57), Defendant Marvell Semiconductor, Inc. ("Marvell") respectfully submits its responsive brief regarding construction of the disputed claim terms of U.S. Patent 5,446,747 ("the '747 patent").

The primary question in dispute is whether the claims require "at least two independent and parallel steps of systematic convolutional coding," as written, or whether the claims merely require two parallel steps of convolutional coding that are deemed "systematic" because a separate unclaimed output provides source data elements, as France Telecom contends. Marvell's position is consistent with the ordinary meaning of the claims to a person of ordinary skill in the art and with the intrinsic record. France Telecom's position requires the claims to be rewritten by the Court to cover Figure 1, even if that flies in the face of the clear ordinary meaning of the claims to a person of ordinary skill. As described herein, neither the intrinsic record nor the understanding of a person of ordinary skill support France Telecom's position.

The terms "convolutional coding" and "systematic convolutional coding" were well known terms to a person of ordinary skill in the art at the time of the alleged invention – no later than April 1991. They are terms of art and not commonly used English terms. As such they should be construed by the Court. Marvell proposes constructions that are consistent with the understanding of persons of ordinary skill in the art at that time and with the intrinsic record. Contrary to France Telecom's assertion otherwise, these terms were not defined by the patentee nor used in the intrinsic record in a contradictory manner. Tellingly, although the alleged invention took place in April 1991 and requires a technical understanding beyond a lay person, France Telecom ***offers no expert opinion or other evidence*** regarding the understanding of a person of ordinary skill in the art on these claim terms, and instead focuses solely on mischaracterizing through attorney argument the intrinsic record.[1] In doing so, France Telecom fails to accord these terms their ordinary meaning as understood by a person of ordinary skill.

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[1] Despite identifying an expert in its Pat. L.R. 4-3 submission, France Telecom did not submit any extrinsic evidence with its opening brief. Because France Telecom could have (footnote continued)

France Telecom asks the Court rewrite the claims through construction to cover Figures 1 and 2, which do not show two independent and parallel systematic convolutional coders, even though the claim clearly requires "two independent and parallel steps of systematic convolutional coding." France Telecom argues this drastic measure is needed to cover the alleged preferred embodiment. However, claims are not required to read on a preferred embodiment, especially where because the clear ordinary meaning of the claim does not cover it. *See Lucent Techs., Inc. v. Gateway, Inc.*, 525 F.3d 1200, 1213-16 (Fed. Cir. 2008).

The claim phrase "at least two independent and parallel steps of systematic convolutional coding" should be given its ordinary meaning as understood by a person of ordinary skill reading the intrinsic record. Although "independent" and "parallel" are ordinary English words, they have special meaning to a person of ordinary skill when used in the context of the claimed coding method. Marvell's construction is consistent with the intrinsic record and the plain language of the claims. France Telecom's construction improperly and vaguely uses the patent figures to define the phrase in a way that has no meaning to a person of ordinary skill.

The claim term "data element" is used in the patent in a way that limits the ordinary meaning. A person of ordinary skill would read the term in the patent as referring to digital data in the form of bits or series of bits. The patent does not use the term "data element" in any other way. France Telecom's construction is unduly broad and does not give meaning to the term. The parties appear to agree that the ordinary meaning of "iterative decoding procedure" requires repeating the same steps in subsequent iterations, and does not permit omitting claimed steps.

Marvell's construction of the disputed terms should be adopted.

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addressed, in its opening *Markman* papers, the facts and opinions contained in the Min declaration filed herewith and the arguments contained herein, it should not be allowed to provide additional evidence or expert opinions on reply. (*See* Pat. L.R. 4-5; D.I. 42, ¶8).

II. BACKGROUND

A. The Asserted Claims Of The '747 Patent

The two asserted claims 1 and 10 of the '747 patent (H. Ex. A)[2] recite respectively a coding method (claim 1) and a decoding method (claim 10). Claim 1 reads as follows:

> 1. A method for error-correction coding of source digital ***data elements***, comprising the steps of:
>
> [i] implementing ***at least two independent and parallel steps of systematic convolutional coding***, each of said coding steps taking account of all of said source data elements and providing parallel outputs of distinct series of coded data elements; and
>
> [ii] temporally interleaving said source data elements to modify the order in which said source data elements are taken into account for at least one of said coding steps. [H. Ex. A, 14:46-56.]

The claim requires that each claimed coding step must be (1) independent, (2) parallel, and (3) systematic convolutional coding. For at least one coding step, the data elements are temporally interleaved to change the order they are presented to that systematic convolutional coding step.

Claim 10 depends from claim 1 and reads as follows:

> A method for decoding received digital data elements representing source ***data elements*** coded according to the coding method of claim 1, wherein said decoding method comprises an ***iterative decoding procedure*** comprising the steps of: in a first iteration,
>
> [i] combining each of said received digital data elements with a predetermined value to form an intermediate data element,
>
> [ii] decoding the intermediate data element representing each received data element to produce a decoded data element,
>
> [iii] estimating said source data element, by means of said decoded data element, to produce an estimated data element, and
>
> for all subsequent iterations, [i] combining each of said received data elements with one of said estimated data elements estimated during a preceding iteration. [*Id.*, 15:26-43.]

Claim 10 requires a sequence of decoding steps that are repeated.

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[2] "H. Ex. __" refers to an exhibit to the Declaration of Eric Huang submitted herewith.

B. The '747 Patent Relates To A Particular Method Of Coding Digital Data

The '747 patent claims priority on its face to April 23, 1991. The alleged invention generally relates to "***the coding of digital data*** belonging to a sequence of source data designed to be transmitted, or broadcast, notably in the presence of transmission noise, and of the decoding of coded data thus transmitted." (H. Ex. A, 1:11-15.) The patentee admitted it was known that "signals such as these are generally coded by means of one or more convolutional coders." (*Id.*, 1:40-41.) He recognized that in prior art decoders, "the original data elements are most frequently reconstructed by means of a maximum likelihood algorithm, for example, a Viterbi algorithm, the decisions of which may possibly be weighted." (*Id.*, 1:42-45.)

Digital data is a series of bits – 1s and 0s. Whether the digital data represent numbers, text, photos, videos, audio or other data, they are ultimately processed as a sequence of 1s and 0s. (Min ¶ 23.)[3] In processing digital data, such as coding, the order of the bits matters. The same 1s and 0s presented in a different order will have different meanings. (Min ¶ 24.)

"Coding" of digital data refers to mathematically processing a sequence of bits to create another sequence of bits, often with more bits, to represent the original bits. The original sequence of bits is often referred to as the "input" data whereas the second sequence of bits is referred to as the "output" data because they are the data input to and output from a coding step, respectively. (Min ¶ 25.) For example, a rate ½ coder would take one input bit and calculate an output of two coded bits. One use for coding is error-correction in transmitted data, where portions of the data (*i.e.*, some of the bits) may be lost or corrupted in transmission. By coding the data, it is possible to reconstruct the data without re-transmitting the data. (Min ¶ 26.) Error-correction coding was well-known in 1991 and used for decades before. Convolutional coding is a specific type of error correction coding used for almost 60 years in several fields, including telecommunications, satellite communications, and in modem technology. (Min ¶ 27.)

[3] "Min ¶ __" refers to the *Declaration of Paul S. Min in Support of Defendant Marvell Semiconductor, Inc.'s Claim Construction Brief*, filed herewith.

In error correction, "systematic" coding is a well known technique where the output of the coding step includes the input data bits that were coded as well as the coded data bits (the result of coding). Systematic coding offers the advantage that the input data is included in the output, so that if there are no errors in transmission, the receiver can just pull the input data without having to decode it. (Min ¶ 29.) Systematic coding has also been used for decades; for example, Reed-Solomon coding is a well-known example of a systematic coding process that was developed in 1960. (*Id.*) Non-systematic coding, where the output only includes coded data and not the original uncoded data, was also known and used prior to 1991. (*Id.*)

France Telecom cites certain accolades earned by Dr. Berrou for his work. (FT's Br. at 4-5.) Praise for Dr. Berrou's work (and the contribution of others to that work) is irrelevant to claim construction and does not equate to praise of the claimed invention. France Telecom presents no nexus between the praise and the claimed invention. *See In re Paulsen*, 30 F.3d 1475, 1482 (Fed. Cir. 1994); *Joy Techs., Inc. v. Manbeck*, 751 F. Supp. 225, 231 (D.D.C. 1990), *aff'd* 959 F.2d 226 (Fed. Cir. 1992). Nor can it. As explained below, the ordinary meaning of the claims to a person of ordinary skill appears to conflict with the disclosure of Figures 1 and 2. France Telecom's efforts to rewrite the claims to cover Figures 1 and 2 and avail itself of such praise should be rejected.

III. LAW OF PATENT CLAIM CONSTRUCTION

"When the parties present a fundamental dispute regarding the scope of a claim term, it is the court's duty to resolve it." *O2 Micro Int'l Ltd. v. Beyond Innovation Tech. Co.*, 521 F.3d 1351, (Fed. Cir. 2008) The "bedrock principle of patent law" is that "the claims of the patent define the invention." *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (en banc) (quoting *Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1115 (Fed. Cir. 2004)). Thus, "the claims are 'of primary importance' in the effort to ascertain precisely what it is that is patented." *Id.* (quoting *Merrill v. Yeomans*, 94 U.S. 568, 570 (1876)). Claims are interpreted "with an eye toward giving effect to all terms in the claim." *Bicon, Inc. v. Diro, Inc.*, 441 F.3d 945, 950 (Fed. Cir. 2006). Claims are construed from the perspective of a person of ordinary skill in the art at the time of the invention. *Phillips*, 415 F.3d at 1312-13. "[T]he

ordinary and customary meaning of a claim term is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention." *Id.* at 1313.

The specification is "intrinsic" evidence and "the single best guide to the meaning of a disputed term." *Id.* at 1315 (quoting *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)). Claims should also be construed in light of the prosecution history before the U.S. Patent and Trademark Office, which is also intrinsic evidence. *See Computer Docking Station Corp. v. Dell, Inc.*, 519 F.3d 1366, 1374-75 (Fed. Cir. 2008). "[A] patentee may limit the meaning of a claim term by making a clear and unmistakable disavowal of scope during prosecution." *Purdue Pharma L.P. v. Endo Pharms., Inc.*, 438 F.3d 1123, 1136 (Fed. Cir. 2006).

Courts may also consider extrinsic evidence, such as dictionaries, treatises or expert testimony, to provide background on the technology at issue, to explain how an invention works, or to explain the meaning of a term as it would be understood by a person of ordinary skill in the art at the time of the invention. *See Phillips*, 415 F.3d at 1317-18.

Claims should generally be construed to preserve their validity. *Id.* at 1327. However, a clear and unambiguous claim term cannot be rewritten contrary to ordinary meaning to preserve validity. *Process Control Corp. v. Hydreclaim Corp.*, 190 F.3d 1350, 1356-57 (Fed. Cir. 1999); *see also Chef Am., Inc. v. Lamb-Weston, Inc.*, 358 F.3d 1371, 1373-74 (Fed. Cir. 2004).

IV. CLAIM CONSTRUCTION OF THE '747 PATENT

The claims of the '747 patent must be construed based on the understanding of a person of ordinary skill in the art at the time of the alleged invention. A person of ordinary skill in the art relevant to the '747 patent at the time of the alleged invention would have at least a Master's degree in electrical engineering or related field and two to three years of experience in communications, including experience with error correction coding. (Min ¶ 22.) Submitted herewith is the declaration of Dr. Paul S. Min, a professor of electrical engineering, who opines on the understanding of a person of ordinary skill in the art relevant to the disputed terms. France Telecom, on the other hand, failed to even describe a person of ordinary skill, let alone

provide evidence of the understanding of such a person. Dr. Min's declaration and opinions stand unrebutted.

A. "Convolutional Coding"

France Telecom's Proposed Construction	Marvell's Proposed Construction
No construction necessary, or if the Court concludes construction is necessary, "codes that associate to each source data element at least one coded data element which is a combination of the source data element and at least one previous source data element"	"calculating an output data element representing current input data and prior input data"

1. The Ordinary Meaning To a Person Of Ordinary Skill Does Not Conflict With The Intrinsic Record

The claim language is clear. Claim 1 expressly requires "implementing at least two independent and parallel steps of systematic ***convolutional coding***, each of said coding steps taking account of all of said source data elements and providing parallel outputs of distinct series of coded data elements." (H. Ex. A, 14:48-52.) The "convolutional coding" recited refers to a ***step*** of coding that is performed. "Convolutional coding" was well-known and had meaning to a person of ordinary skill in the art at the time of the alleged invention. (Min ¶ 27; *see also* FT's Br. at 6.)[4] It is a type of coding where the calculation of the coded data is performed using preceding input bits along with the current input bit. (Min ¶ 34.)

The intrinsic record does not conflict with the claim language as understood by a person of ordinary skill. Contrary to France Telecom's assertion otherwise, the specification does not provide a special meaning for this term. The only discussion of the step of convolutional coding in the specification acknowledges that "convolutional coding" was well-known in the art. (H. Ex. A, 8:51-53.) There is no express definition of the step of convolutional coding in the patent specification that requires a different meaning for the term.

[4] "FT's Br." refers to France Telecom's opening claim construction brief, D.I. 83.

Nor does the prosecution history suggest that the patentee assigned a special meaning to the term; during prosecution, it is clear that the patentee relied on the well-known understanding of "convolutional coding" in the prior art. (*See* Min Ex. Q, at FT000244-45.)

This ordinary understanding of the term is also supported by the extrinsic evidence. For example, Wang U.S. Patent 5,052,000 notes that "the value of each bit in convolutional coding is a function of the information bits in the associated block and a number of priorly transmitted blocks." (Min Ex. C, at MSIFT00039528 (emphasis added).) Karplus U.S. Patent 5,157,671 describes convolutional coding as a set of equations where "each parity bit P(t) is computed from previous data bits v(t)." (Min Ex. D, at FT000262.) One prior art article notes that for a "k=7 convolutional code," that "the value of the output bits depends on seven user data bits." (Min Ex. E, at 46.) Marvell's proposed construction is fully consistent with the ordinary meaning as understood by a person of ordinary skill in the art. (Min ¶¶ 36-37.)

2. France Telecom Ignores Ordinary Meaning To Assign A Self-Serving Construction Based Solely On A Figure In The Patent

France Telecom's proposed alternate construction should be rejected because it is not supported by either the intrinsic evidence nor the ordinary understanding of a person of ordinary skill. Instead, it incorrectly seeks to assign a special definition for the step of "convolutional coding" based on a description ***of the output of the claimed method***, rather than ***of the claimed step***. There is nothing in the patent that requires a special meaning for the term.

The parties agree that "convolutional coding" involves some combination or calculation using previous data elements. The problem with France Telecom's alternate construction is that it defines each step of "convolutional coding" using the phrase "previous source data elements" rather than referring to the data elements input to the step. "Source data element" is a term with a special meaning in the '747 patent. The parties agreed to construe "source data element" as a "data element to be coded ***by the claimed method***" (D.I. 81 at 2 (emphasis added)), not each constituent coding step of the claimed method (Min ¶ 39).

One of ordinary skill in the art, however, would understand that a step of convolutional coding uses the bits of data input to ***that coding step***. (Min ¶ 40.) While that input might be

source data elements, it can be other data elements. This is significant in Claim 1, because at least one of the claimed coding steps ***receives an input that is not source data elements*** – the claim requires at least one coding step to receive the output of the temporally interleaving step. As discussed above, the step of temporally interleaving changes the order of the data elements presented to one coding step. (H. Ex. A, 14:53-56).

Contrary to France Telecom's assertion otherwise, the patentee did not define the term "convolutional coding." Although "the specification may reveal a special definition given to a claim term by the patentee that differs from the meaning it would otherwise possess," *Phillips*, 415 F.3d at 1316, here the patent does not reveal any definition of ***the step*** of "convolutional coding." France Telecom incorrectly identifies the following passage as a definition of "coding" even though it merely describes prior art "convolutional codes":

> Convolutional codes are codes that associate at least one coded data element with each source data element, this coded data element being obtained by the summation modulo 2 of this source data element with at least one of the preceding source data elements. Thus, each coded symbol is a linear combination of the source data element to be coded and of previous data source elements taken into account. [H. Ex. A, 1:46-53.]

A "convolutional ***code***" is different from "convolutional ***coding***" (Min ¶ 35); there may be many methods of producing a convolutional code, but the patent describes only one particular method – one that uses two separate and parallel steps of systematic convolutional coding and a step of temporally interleaving prior to one of the coding steps. Furthermore, this passage discusses prior art codes that result from one step where the input is a source data element. It does not define address a coding step where the input is not a source data element.

France Telecom's authority is distinguishable. The patentee here did not use quotation marks around the term "convolutional coding" in the specification. *Cf. Oracle Am., Inc. v. Google Inc.*, No. C 10-03561 WHA, 2012 WL 243263, at *2-*3 (N.D. Cal. Jan. 25, 2012) ("Indeed, quotation marks were used around the phrase 'computer-readable medium,' a strong indication that what followed was a definition."); *Network Prot. Sci., LLC v. Fortinet, Inc.*, No. C 12-01106 WHA, 2013 WL 146033 (N.D. Cal. Jan. 14, 2013) (noting passage defined the term

"proxies," which was distinguished by quotation marks); *see also Sinorghem Co. v. Int'l Trade Comm'n*, 511 F.3d 1132, 1136 (Fed. Cir. 2007) ("The term 'controlled amount' is set off by quotation marks – often a strong indication that what follows is a definition."). Nothing in the specification requires the special meaning and nothing in the specification contradicts Marvell's construction. France Telecom's alternate construction must be rejected.

One of ordinary skill would understand that "convolutional coding" is a calculation of an output data element using the current and prior input data. Because the patentee did not assign a special meaning to this term, the Court should accept Marvell's construction.

B. "Systematic Convolutional Coding"

France Telecom's Proposed Construction	**Marvell's Proposed Construction**
No construction necessary, or if the Court concludes construction is necessary, "convolutional coding in which the source data elements are transmitted jointly with coded data elements"	"convolutional coding where the output includes both the coded data and the current input data"

1. The Ordinary Meaning of the Term To a Person Of Ordinary Skill Does Not Conflict With The Intrinsic Record

The claim is clear. Claim 1 requires "implementing at least two independent and parallel steps of ***systematic*** convolutional coding, each of said coding steps taking account of all of said source data elements and providing parallel outputs of distinct series of coded data elements." (H. Ex. A, 14:48-52.) Thus, by its terms, the claim requires each recited coding step to be "systematic." The term "systematic convolutional coding" was well-known and had an ordinary meaning to persons of ordinary skill at the time of the alleged invention. (Min ¶ 42.) It was understood to mean a step of coding where the output includes both the coded data and the data input to the step. (*Id.*)

The intrinsic record does not conflict with the claim language as understood by a person of ordinary skill. The '747 patent does not provide a special meaning and does not define the step of systematic convolutional coding. Rather, the patent describes modules and

generally describes them as "of any known systematic type." (H. Ex. A, 7:60-61.) The patent describes the modules 11 and 13 in Figure 1 as preferably using "pseudo-systematic codes":[5]

> In this case, the coding modules 11 and 13 preferably use codes such as those described in the already mentioned French patent application No. FR 91 05278. These codes, known as "pseudo-systematic codes" are characterized by the fact that the source data element is transmitted systematically, jointly with at least one coded data element or redundancy symbol.

(H. Ex. A, 8:16-22.) The passage does not talk about ***coding*** systematically, but rather ***transmitting*** systematically. (*Id*.) France Telecom relies on this passage but it does not define or describe the claimed step, it only describes an unclaimed step of "transmitting."

The patent also describes a particular pseudo-systematic convolutional coder shown in Figure 7 that "associates two coded values X_k and Y_k to each source data element d_k" and that the "data element X_k is systematically taken to be equal to the source value d_k." (*Id.*, Fig. 7, 8:36-39.) This passage and Figure 7 do not describe the structure that performs ***the claimed method*** but rather an example of one coding step that could be used in place of items 11 or 13 in Figure 1. For each input data element (which is also the source data element in Figure 7), the recited systematic coder of Figure 7 outputs two data elements – a coded data element and a data element equal to the source value or input data. (*Id.*) This supports Marvell's construction.

There is also nothing in the '747 patent file history that suggests otherwise. During prosecution, it is clear that the patentee relied on the well-known understanding of "systematic convolutional coding" in the prior art. (*See* Min Ex. Q, at FT000244-45.)

The extrinsic evidence also supports Marvell's proposed construction of "systematic convolutional coding." Numerous scholarly articles discuss the well-known understanding of "systematic convolutional coding" and use the terms "input" and "output." For example, a 1987 article by Gottfried Ungerboeck explains that "[w]ith a systematic encoder, ***input bits appear***

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[5] The "pseudo-systematic codes" are the result of a variation of convolutional coding where intermediate values derived from prior input data is used. (H. Ex. A, 8:46-53.) It is still the product of a systematic coding step, performed according to Figure 7. (*Id.*)

unchanged at the output." (Min Ex. F, Ungerboeck at MSIFT00039463 (emphasis added).) A 1989 article notes that a systematic generator or coder causes the input message sequences "to be reproduced exactly in the code sequences." (Min Ex. G, Fuja at MSIFT00040383.) This has been the understanding of persons of ordinary skill in the art for decades. A 1970 article by Forney discusses "a simple binary systematic rate-1/2 convolutional encoder of constraint length 2" where the outputs are "two binary sequences" where the "first output sequence y_1 is simply equal to the input x (hence the code is systematic)." (Min Ex. H, Forney at MSIFT00040392-93.) As Dr. Min notes, the common theme is that the coding step includes the input data as part of the coded output. (Min ¶¶ 43-45; *see also* Min Exs. F – P). The extrinsic evidence does not disclose a systematic convolutional coding step that only provides coded data as an output without also providing the input data as an output.

2. France Telecom's Construction Reads Out Critical Claim Elements To Cover An Alleged Preferred Embodiment

France Telecom's alternate construction incorrectly broadens the claims to eliminate the need for each coding step to be "systematic" in conflict with the understanding of the term by a person of ordinary skill in the art. Under its construction, any convolutional coding step is "systematic" as long as source data elements are "transmitted jointly" with coded data elements. "Transmitting" is not even required by the claim and is not a step, let alone part of the coding step. In essence, France Telecom argues that "systematic" is not a characteristic of the coding step, but rather a characteristic of the claimed method, even though the claim does not require transmitting and the language clearly requires each coding step to be "systematic." Under France Telecom's construction, a particular convolutional coding step may be both systematic or non-systematic, depending on the context in which the coding step is performed. This is inconsistent with the disclosure of the '747 patent, which expressly describes that "systematic" refers to a type of the convolutional coding step. (H. Ex. A, 7:60-61 ("The modules 11 and 13 may be of any known systematic type.")). Its construction flouts the plain language of the claim and must be rejected.

France Telecom mischaracterizes the specification and makes an unsupported argument that Figure 7 "shows that a coding module *can* take an input source data element d_k and output it as data element X_k, but it does not *need* to if X_k can be obtained elsewhere." (FT's Br. at 10 (emphasis in original).) This is misleading and not true. Figure 7 represents one convolutional coding step that is systematic – it produces two data elements for each input data element:

> An example of a coder (having a constraint length *v*=2 and efficiency rate R = ½) implementing this technique is illustrated in FIG. 7.
>
> This coder associates two coded values X_k and Y_k to each source data element d_k.
>
> The data element X*k* is systematically taken to be equal to the source value $d_{k.}$

(H. Ex. A, 8:33-39.) This is consistent with the understanding of a person of ordinary skill in the art and with Marvell's construction. (Min ¶¶ 42-45.) There is no suggestion in the patent that a "systematic coding step" need not output X_k if it can be obtained elsewhere, as France Telecom suggests.

France Telecom further argues that "the point of Figure 7 is to explain how the coded data element Y*k* is output by the module." (FT's Br. at 10.) Not only is this argument irrelevant to the meaning of "systematic convolutional coding," but the passage cited by France Telecom only serves to distinguish the "pseudo-systematic codes" discussed in the patent from "the known convolutional coding methods which take the direct account of the series of the preceding source values." (H. Ex. A, 8:46-53.) This alleged "essential characteristic of the invention" is not even claimed by the '747 patent, because the claims recite steps of "systematic convolutional coding," and not the use or creation of "pseudo-systematic codes."

France Telecom also incorrectly argues that because claim 1 requires the systematic convolutional coding steps "provid[e] parallel outputs of distinct series of coded data elements," the claims should be read to cover steps of convolutional coding that output only coded data while input data is provided by other elements. As even France Telecom points out, the claim language is silent as to whether the input, uncoded data elements are also provided as outputs of

these steps in the claim. (FT Br. at 10-11.) But this is because the ***recited coding steps are systematic***, which a person of ordinary skill in the art would understand necessarily provide the uncoded input data elements as output. (Min ¶¶ 42-45.)

Finally, France Telecom incorrectly argues that Marvell's construction excludes all embodiments described in the '747 patent. (FT's Br. at 8-9). Although it relies on Figures 1 and 2, these figures at best do not provide sufficient detail to determine these embodiments would be covered by claim 1. There may be other inputs and outputs that are not illustrated. The specification states that each of modules 11 and 13 use the described "pseudo-systematic codes." (H. Ex. A, 8:16-22.) Figure 7 is a "pseudo-systematic coder" that is consistent with Marvell's construction. (*Id.*, 8:33-39.) A person of ordinary skill in the art would recognize that the coders of Figure 7 can be arranged in parallel as shown in Figure 1, with each coding module outputting its respective coded data elements and input data elements. Thus, if Figures 1 and 2 are not meant to be exclusionary – that is, if not all outputs from the coders are depicted – then these figures do not contradict Marvell's proposed construction.

If, however, Figures 1 and 2 depict all inputs and outputs, then these figures, as illustrated, contradict the express claim language, and cannot serve to advance a construction that contradicts the express claim language. France Telecom urges the Court to rewrite the claim language to cover these alleged preferred embodiments. (FT's Br. at 8-9.) This is both unnecessary and inappropriate. Claims need not be construed to cover the preferred embodiment. *See Lucent Techs., Inc. v. Gateway, Inc.*, 525 F.3d 1200, 1213 (Fed. Cir. 2008).

In *Lucent*, the district court construed the phrase "each successive iteration including the steps of" to require that all five of the recited claim steps to be performed in forming each pulse. 525 F.3d at 1213. The patentee argued that the sole embodiment described in the patent performs the first four recited steps only during each frame-base iteration and not in producing each pulse, thus contradicting the district court's construction. *Id.* at 1214. The Federal Circuit agreed with plaintiff that the construction "is not supported by the sole embodiment described in the specification." *Id.* However, the Federal Circuit held that "the claim language clearly

supports the district court's claim construction," and declined to redraft the claim language to encompass the described embodiment. *Id.* at 1215-16.

In fact, courts have recognized that it is not appropriate to rewrite unambiguous claims in claim construction to preserve validity or otherwise add limitations. *See, e.g.*, *SRAM Corp. v. AD-II Eng'g, Inc.*, 465 F.3d 1351, 1359 (Fed. Cir. 2006) ("While SRAM strongly urges the court to interpret the claim to encompass the innovative precision indexing shifting feature it claims it has invented, we are powerless to rewrite the claims and must construe the language of the claim at issue based on the words used."); *Allen Eng'g Corp. v. Bartell Indus., Inc.*, 299 F.3d 1336, 1349 (Fed. Cir. 2002) ("It is not our function to rewrite claims to preserve their validity."); *Rhine v. Casio, Inc.*, 183 F.3d 1342, 1345 (Fed. Cir. 1999) (rejecting district court's construction that "is contrary to the plain language of the claim"); *Quantum Corp. v. Rodime, PLC*, 65 F.3d 1577, 1584 (Fed. Cir. 1995) ("Although we construe claims, if possible, so as to sustain their validity, it is well settled that no matter how great the temptations of fairness or policy making, courts do not redraft claims.") Here, the claim language unambiguously requires at least two steps of *systematic* convolutional coding. The specification is consistent with this. The fact that Figure 1 and Figure 2 may not be covered by the claims under Marvell's construction does not dictate a different construction here, in the face of the clear claim language.

One of ordinary skill in the art would understand that "systematic convolutional coding" is "convolutional coding where the output includes both the coded data and the current input data." Because the patentee did not assign a special meaning to this term, and because France Telecom's construction is imprecise and ambiguous, the Court should construe the term to have its ordinary meaning to a person of ordinary skill in the art.

C. "At Least Two Independent And Parallel Steps of Systematic Convolutional Coding"

France Telecom's Proposed Construction	Marvell's Proposed Construction
No construction necessary, or if the Court concludes construction is necessary, "at least two steps of systematic convolutional coding that are performed in parallel rather than in series, including without limitation as shown in Figures 1 and 2"	"at least two separate and distinct steps of systematic convolutional coding, not in series, simultaneously carried out"

1. Marvell's Construction Gives Full Meaning To Requirements That The Coding Steps Are "Independent" And "Parallel"

Marvell's construction is supported by the claim language. Claims are interpreted "with an eye toward giving effect to all terms in the claim." *Bicon, Inc. v. Diro, Inc.*, 441 F.3d 945, 950 (Fed. Cir. 2006). Marvell's construction gives effect to all the words of the claim term whereas France Telecom seeks to read out requirements. Claim 1 recites "at least two ***independent and parallel*** steps of systematic convolutional coding." (H. Ex. A, 1:48-52.) This phrase requires that each coding step is a step of systematic convolutional coding, that each coding step is independent (*i.e.*, separate and distinct), and that each coding step is performed in parallel (*i.e.*, not in series, simultaneously carried out). This clear and express claim language must control. France Telecom on the other hand seeks a construction that eliminates the requirement that the steps be "independent."

(a) "Parallel" Means "Not in Series, Simultaneously Carried Out"

The specification states that "[t]he present invention relies on two novel concepts, namely a coding method ***simultaneously carrying out*** several coding operations, in parallel, and a method of iterative coding." (H. Ex. A, 7:31-34.) Because the operations are carried out simultaneously, the patent states that "the overall rate of the code is higher" and "the coding and decoding circuits are simpler as regards their clock signals." (*Id.*, 9:7-14.) By arranging the

steps of systematic convolutional coding in parallel, they are carried out at the same time, (Min ¶ 51), as opposed to steps arranged in series, performed one at a time. (Min ¶ 50.)

Furthermore, during prosecution, the patentee amended the pending claims to add the "parallel" requirement in Claim 1 to distinguish prior art. (*See* Min Ex. Q, at FT000235.)

> Betts, U.S. Patent No. 4,677,626, discloses a self-synchronizing interleaver for trellis encoder using a single classical encoder 20 which includes long delay units 22, 24 and 26. While Betts does disclose the use of multiple trellis decoders 56, 58, 60 and 62, ***the trellis decoders are used only one at a time*** (column 3, lines 57-60). Thus the data fed to any single trellis decoder is necessarily not fed to any of the other trellis decoders. ***There is no suggestion in Betts that the trellis decoders should be used in parallel***.

(*Id.* at FT000244 (emphasis added).) Thus, the term "parallel" was added to distinguish prior art where multiple decoders were used only one at a time.

Dictionaries are acceptable extrinsic evidence on which to rely for claim construction; these support Marvell's view. The term "parallel" is defined as requiring operations that are performed simultaneously. (*See, e.g.*, H. Ex. C, AM. HERITAGE DICTIONARY at MSIFT00040306 ("Of or relating to the simultaneous performance of multiple operations: *parallel processing*."); H. Ex. E, MICROSOFT PRESS COMP. DICTIONARY at FT004658 ("In parallel processing and other such operations, more than one event is happening at a time . . . .").) Marvell's construction is consistent with the ordinary meaning of "parallel" as understood by a person of ordinary skill in the art. (Min ¶¶ 51-53.)

(b) "Independent" Means "Separate & Distinct"

The claim requires that the two recited coding steps be "independent." A person of ordinary skill in the art would understand this term to mean "separate and distinct." (Min ¶ 55.) Independent is a commonly used English word that refers to the two recited coding steps. The patent discusses and describes the at least two recited coding steps and makes clear that the

coding steps are "distinct."[6] (H. Ex. A, 7:54-57 ("According to this method, it is seen, therefore, that there are at least two coded data elements Y_1 and Y_2, coming from ***distinct coders 11 and 13***, associated with each source data element. (emphasis added)"); *see also id.*, 7:47-49.) The prosecution history, however, makes clear that the "entirety of the source data element sequence" is applied to both steps of convolutional coding, meaning "two independent codings take place."[7] (*See* Min Ex. Q, at FT000243.) The claim requires that the two coding steps be "independent" and this requirement must be reflected in the construction. Thus, each recited coding step must operate on their respective input data. They are not dependent on one another.

Dictionary definitions of "independent" confirm that this requires the two coding steps to not depend on or be contingent on something else. (*See* H. Ex. B, at FT004735 ("Not depending on something else for its existence, validity, efficiency, operation, or some other attribute; not contingent on or conditioned by anything else."); H. Ex. C, at MSIFT00040297 ("Not dependent or affiliated with a larger or controlling group or system.").) Marvell's construction is also consistent with the ordinary meaning of "independent" as understood by a person of ordinary skill in the art. (Min ¶¶ 54-55.)

2. France Telecom's Proposed Construction Improperly Reads Out The Claim Term "Independent"

France Telecom's proposed construction, on the other hand, ignores the express requirement of the claim language that the coding steps be independent. This is improper.

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[6] Marvell does not contend that the two coding steps must perform distinct coding algorithms, only that they must be separate and distinct from one another. The patent makes clear that the codes implemented by the coding steps "may be identical or, preferably, different." (H. Ex. A, 7:64-65.)

[7] France Telecom incorrectly argues that there was no express disavowal during prosecution, but this is inapposite. "Separate and distinct" is simply a synonym for independent. The patentee did not differentiate the scope of one claim from the scope of another claim using different language. *Cf. Abbott Labs. v. Sandoz, Inc.*, 566 F.3d 1282, 1290 (Fed. Cir. 2009) (finding disavowal of coverage of "Crystal B"); *Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 909 (Fed. Cir. 2004) (relying on omission of "pressure jacket" from certain claims to find those claims did not require pressure jackets).

As discussed in greater detail *supra* Section IV.B.2 *above*, France Telecom's construction broadens the claims to encompass methods where each convolutional coding step is not systematic. As depicted, Figures 1 and 2 do not show two steps of systematic convolutional coding. (Min ¶ 57.) It shows only that the input data to the first coding step is included in the output of the coding method, but not the input data to the second coding step, as is required by the express claim language. France Telecom relies solely on the fact that Boxes 11 and 13 in the figures are marked "FIRST SYSTEMATIC CODING" and "SECOND SYSTEMATIC CODING." (FT's Br. at 14.) But, as the patent makes clear, each of coding modules 11 and 13 outputs two data elements – the coded data and the input data – for each input data element. (H. Ex. A, 8:33-39.) In order for each of the coding steps to be systematic, each coding step must include its respective input data as part of its respective output.

France Telecom incorrectly argues that the system illustrated in Figure 1 shows two steps of systematic convolutional coding because the "transmitted source data element X can be ***shared*** between the two systematic convolutional coders." (FT's Br. at 12 (emphasis added).) In essence, France Telecom argues that the systematic nature of each coding step can ***depend*** on the systematic nature of the other coding step. That is not the case. The claim expressly requires at least two ***independent*** and parallel steps of systematic convolutional coding. Under France Telecom's construction, it is ***impossible*** to have a situation where only one coding step is systematic and the other coding step is non-systematic. (Min ¶ 57.) France Telecom argues that it is consistent with the alleged invention's aim of providing "particularly efficient" methods of transmission in noisy channels. But even if that were true, the claim language may not be rewritten to achieve the stated goals of the invention. *See SRAM Corp.*, 465 F.3d at 1359 ("While SRAM strongly urges the court to interpret the claim to encompass the innovative precision indexing shifting feature it claims it has invented, we are powerless to rewrite the claims and must construe the language of the claim at issue based on the words used.").

France Telecom's claim differentiation argument (FT's Br. at 16) is inapposite. The fact that a delay step may be implemented after the interleaving step is not inconsistent with the plain and ordinary meaning of "parallel" as understood by a person of ordinary skill in the art. (Min ¶

59.) With a delay step, the two parallel coding steps are not being performed ***synchronously***, but they are still carried out ***simultaneously***. A simple analogy demonstrates this difference. Two runners in the New York City Marathon may start the race at different times based on their starting position, with the one further back delayed in reaching the starting line. Despite the fact that the runners start the race at different times, they are still running the race simultaneously. The recitation of a delay step does is not inconsistent with the requirement that parallel coding steps are carried out simultaneously.

Moreover, France Telecom's reference to Figures 1 and 2 would, in fact, render the claim indefinite. Because a person of ordinary skill would understand that the claim language expressly requires two independent and parallel steps of systematic convolutional coding, and because Figures 1 and 2, as depicted, clearly do not illustrate two independent and parallel steps of systematic convolutional coding, a person of ordinary skill in the art would be unable to determine a meaningful claim scope in light of this apparent contradiction. *See Halliburton Energy Servs., Inc. v. M-I LLC*, 514 F.3d 1244, 1251 (Fed. Cir. 2008); *Datamize, LLC v. Plumtree Software, Inc*., 417 F.3d 1342, 1347 (Fed. Cir. 2005).

D. "Data Element"

France Telecom's Proposed Construction	Marvell's Proposed Construction
No construction necessary, or if the Court concludes construction is necessary, "a single unit of data"	"bits (1 or 0) or series of bits (i.e., a sequence of 1s and 0s) to be considered as a block"

The claim term "data element" would be understood by a person of ordinary skill in the art reading the '747 patent to refer to bits or series of bits that are considered together as a block. The patent makes clear that the "field of the invention is that of the coding of ***digital data***." (H. Ex. A, 1:10-11 (emphasis added).) Digital data is represented by bits. (Min ¶ 61.)

While symbols or real variables might be used, as France Telecom argues, a person of ordinary skill would recognize that the type of coding and processing disclosed in the patent will be performed on a bit level, after the symbol or real variables have been converted to digital bits.

(Min ¶ 69.) The patent describes "binary symbols." (H. Ex. A, 8:40-42.) The patent notes that real variables are "samples coded on n bits (typically n=4)," that is, ***as a series of bits***. (*Id.*, 11:30-32.) Ultimately, all digital data is represented by bits or series of bits. For example, the modulo 2 addition described in connection with convolutional coding, (*Id.*, 1:46-48), is a mathematical operation that is performed on bits where the only values are 1s and 0s. (Min ¶ 64.) There is nothing in the prosecution history to indicate that the digital data coded and decoded by the claimed methods are not bits or series of bits. (*See* Min Ex. Q, '747 patent file history at FT000233-45.) One of ordinary skill in the art would understand the digital data described in the '747 patent refers to bits or series of bits of data to be considered as a block. (Min ¶ 65.)

France Telecom's criticism of the word "block" in Marvell's proposed construction is misplaced. (FT's Br. at 18.) The word "block" addresses data elements that are series of bits. Notably, France Telecom's construction does not exclude blocks or sequences of bits from "data element." Furthermore, the concepts disclosed in and claimed by the patent apply to error-correction generally, whether convolutional or block coding is used. (Min ¶¶ 23-30.)

France Telecom's alternative construction is vague and imprecise and provides no guidance as to the ordinary meaning of the term. France Telecom contends that a data element can be symbols or real variables, and thus should not be limited to bits. (FT's Br. at 17.) France Telecom does not appear to dispute that data can be grouped together to be coded and decoded. The term "unit" used by France Telecom is vague and adds nothing to the understanding of the term. (Min ¶ 70.) A "block" is recognized as a set of bits of data that are processed together. (*Id.*) A "unit" can refer to a single bit, a symbol (represented as a series of bits), or a collection of symbols. (*Id.*) While "block" and "unit" suggest the same concept – a collection of data – "block" is a term that is more precise in describing digital data. (*Id.*)

E. "Iterative Decoding Procedure"

France Telecom's Proposed Construction	Marvell's Proposed Construction
No construction necessary, or if the Court concludes construction is necessary, "a decoding procedure involving repetition of one or more steps with the goal of achieving successively improved results"	"process for decoding data by repeating the same sequence of decoding steps"

France Telecom appears to agree with Marvell that Claim 10 requires a sequence of steps to be performed in order. (FT's Br. at 19-20.) Given that the parties appear to agree that each of steps [a] – [c] must be repeated in that order for each iteration, Marvell agrees that no construction is necessary. To the extent that France Telecom contends that the ordinary meaning allows one of the claim steps to be omitted in any iteration, that would be contrary to the understanding of a person of ordinary skill in the art, and must be rejected.

V. CONCLUSION

For the foregoing reasons, Marvell respectfully requests that the Court adopt Marvell's proposed constructions for the disputed terms.

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CERTIFICATE OF SERVICE

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